ELSEVIER

Journal of Non-Crystalline Solids 225 (1998) ix–xii

JOURNAL OF NON-CRYSTALLINE SOLIDS

# Contents

*Preface* . . . . . vii

*Contents* . . . . . ix

**Section 1. Non-conventional drying techniques**

Light gels by conventional drying
M.-A. Einarsrud . . . . . 1

Texture control of freeze-dried resorcinol–formaldehyde gels
R. Kocklenberg, B. Mathieu, S. Blacher, R. Pirard, J.P. Pirard, R. Sobry and G. Van den Bossche . . . 8

Drying of aerogels in different solvents between atmospheric and supercritical pressures
F. Kirkbir, H. Murata, D. Meyers and S. Ray Chaudhuri . . . . . 14

Optical polarized reflectance characterization of thin aerogel and xerogel films
J.L. Hostetler, D. Stewart, C.E. Daitch, C.S. Ashley and P.M. Norris . . . . . 19

Hydrophobic waterglass based aerogels without solvent exchange or supercritical drying
F. Schwertfeger, D. Frank and M. Schmidt . . . . . 24

Humic acid gel drying with supercritical carbon dioxide
R.J. Willey, A. Radwan, M.E. Vozzella, A. Fataftah, G. Davies and E.A. Ghabbour . . . . . 30

**Section 2. Organic aerogels**

Polyurethane-based organic aerogels' thermal performance
G. Biesmans, D. Randall, E. Francais and M. Perrut . . . . . 36

Structure of carbon aerogels near the gelation limit of the resorcinol–formaldehyde precursor
R. Petričević, G. Reichenauer, V. Bock, A. Emmerling and J. Fricke . . . . . 41

Low-density organic aerogels by double-catalysed synthesis
K. Barral . . . . . 46

Effects of processing variable on melamine–formaldehyde aerogel formation
M.H. Nguyen and L.H. Dao . . . . . 51

In situ infrared observation of the pyrolysis process of carbon aerogels
J. Kuhn, R. Brandt, H. Mehling, R. Petričević and J. Fricke . . . . . 58

Polyurethane based organic aerogels and their transformation into carbon aerogels
G. Biesmans, A. Mertens, L. Duffours, T. Woignier and J. Phalippou . . . . . 64

Influence of monomer and catalyst concentration on RF and carbon aerogel structure
V. Bock, A. Emmerling and J. Fricke . . . . . 69

Carbon aerogels for electrochemical applications
R.W. Pekala, J.C. Farmer, C.T. Alviso, T.D. Tran, S.T. Mayer, J.M. Miller and B. Dunn . . . . . 74

High surface area carbon aerogels for supercapacitors
R. Saliger, U. Fischer, C. Herta and J. Fricke . . . . . 81

## Section 3. Inorganic aerogels

*A. Process*

Diffusion of ethanol–carbon dioxide in silica gel
P. Wawrzyniak, G. Rogacki, J. Pruba and Z. Bartczak . . . . . 86

Self and transport diffusion of fluids in $SiO_2$ alcogels studied by NMR pulsed gradient spin echo and NMR imaging
W. Behr, A. Haase, G. Reichenauer and J. Fricke . . . . . 91

Ultralow density silica aerogels by alcohol supercritical drying
L. Kocon, F. Despetis and J. Phalippou . . . . . 96

High strength $SiO_2$ aerogel insulation
Z. Deng, J. Wang, A. Wu, J. Shen and B. Zhou . . . . . 101

*B. New synthesis*

$TiO_2$-impregnated $SiO_2$ aerogels by alcohol supercritical drying with zeolite
S. Yoda, Y. Tasaka, K. Uchida, A. Kawai, S. Ohshima and F. Ikazaki . . . . . 105

$NiO–Al_2O_3$ aerogel from $(CH_2O)_2Ni$ and AlOOH sol
T. Osaki, T. Horiuchi, T. Sugiyama, K. Suzuki and T. Mori . . . . . 111

Preparation effects on zirconia aerogel morphology
J. Mrowiec-Białoń, L. Pająk, A.B. Jarzębski, A.I. Lachowski and J.J. Malinowski . . . . . 115

Synthesis and sintering of zirconium oxide aerogel
A. Lecomte, F. Blanchard, A. Dauger, M.C. Silva and R. Guinebretière . . . . . 120

Preparation and characterisation of forsterite ($Mg_2SiO_4$) aerogels
M.B.D. Mitchell, D. Jackson and P.F. James . . . . . 125

Monolithic crystalline lead zirconate titanate aerogels
P. Löbmann, W. Glaubitt, S. Geis and J. Fricke . . . . . 130

Sol–gel synthesis and characterization of molybdenum oxide gels
W. Dong and B. Dunn . . . . . 135

Lanthanide-doped $SiO_2–Al_2O_3$ aerogels and densified glasses
S. Grandi and L. Costa . . . . . 141

## Section 4. Catalysts. Surface function

High-temperature catalysts through sol–gel synthesis
A.J. Lecloux and J.P. Pirard . . . . . 146

Oxide aerogel catalysts
H. Hirashima, C. Kojima, K. Kohama, H. Imai, V. Balek, H. Hamada and M. Inaba . . . . . 153

Vanadia–titania aerogel de$NO_x$ catalysts
C. Hoang-Van, O. Zegaoui and P. Pichat . . . . . 157

Fluorination effects in chromia aerogels and xerogels
T. Skapin and E. Kemnitz . . . . . 163

Nickel–alumina aerogel catalysts prepared by fast sol–gel synthesis
D.J. Suh, T.-J. Park, J.-H. Kim and K.-L. Kim . . . . . 168

Oxidation of methanol over iron oxide based aerogels in supercritical $CO_2$
C.-T. Wang and R.J. Willey . . . . . 173

$WO_3/ZrO_2$ catalysts by sol–gel processing
M. Signoretto, M. Scarpa, F. Pinna, G. Strukul, P. Canton and A. Benedetti . . . . . 178

Two-component aerogel adsorbents of water vapour
J. Mrowiec-Białoń, A.B. Jarzębski, A.I. Lachowski and J.J. Malinowski . . . . . 184

Vanadia–silica aerogels from vanadylacetylacetonate
U. Klett and J. Fricke . . . . . 188

## Section 5. Aerogel texture

Adsorption in aerogel networks
G.W. Scherer . . . . . 192
Neutron scattering studies of the structure and mechanisms of adsorption in porous oxide gels
J.D.F. Ramsay and E. Hoinkis . . . . . 200
Suppression of $^3$He superfluidity by aerogel
J.V. Porto, A. Golov, K. Matsumoto, R.D. Biggar and J.M. Parpia . . . . . 205
Microporosity in carbon aerogels
G. Reichenauer, A. Emmerling, J. Fricke and R.W. Pekala . . . . . 210
Textural properties of densified aerogels
S. Calas and R. Sempéré . . . . . 215
Small angle X-ray scattering of aerogel densification
Ph. Dieudonné, P. Delord and J. Phalippou . . . . . 220
SAXS investigation of morphology changes in lead–titanate aerogels
S. Geis, P. Löbmann and J. Fricke . . . . . 226
Sintering and crystallization of $La_2O_3$-doped $Al_2O_3$ aerogels from chemically modified aluminum alkoxide
K. Tadanaga, H. Kobayashi and T. Minami . . . . . 230

## Section 6. Aerogel structure

Characterization of multi-phase aerogels by contrast-matching SANS
C.I. Merzbacher, J.G. Barker, K.E. Swider, J.V. Ryan, R.A. Bernstein and D.R. Rolison . . . . . 234
Structural models of dense aerogels
L. Esquivias, J. Rodriguez-Ortega, C. Barrera-Solano and N. De La Rosa-Fox . . . . . 239
Brillouin scattering study of sintered and compressed aerogels
S. Calas, C. Levelut, T. Woignier and J. Pelous . . . . . 244
A low frequency Raman study of fractons in partially densified silica aerogels
E. Anglaret, I. Beurroies, L. Duffours, C. Levelut, M. Foret, P. Delord, T. Woignier, J. Phalippou and J. Pelous . . . . . 248

## Section 7. Properties

### *A. Thermal*

Aerogel-based thermal insulation
D.M. Smith, A. Maskara and U. Boes . . . . . 254
Structural investigation in monolithic silica aerogels and thermal properties
A. Rigacci, P. Achard, F. Ehrburger-Dolle and R. Pirard . . . . . 260

### *B. Mechanical and acoustic*

Subcritical crack velocity in silica aerogels
P. Etienne, F. Despetis and J. Phalippou . . . . . 266
Brillouin scattering of aerogels densified under uniaxial pressure
C. Levelut, E. Anglaret and J. Pelous . . . . . 272
Elastic properties of xerogels and sintered aerogels probed by inelastic light scattering
F. Terki, J. Pelous, P. Dieudonné and T. Woignier . . . . . 277
Elastic properties of silica aerogels from a new rapid supercritical extraction process
J. Gross, P.R. Coronado and L.W. Hrubesh . . . . . 282
Biot's theory of acoustic propagation in porous media applied to aerogels and alcogels
L. Forest, V. Gibiat and T. Woignier . . . . . 287

*C. Permeability*

Gas flow through aerogels
B. Hosticka, P.M. Norris, J.S. Brenizer and C.E. Daitch . . . . . 293

Liesegang pattern formation by gas diffusion in silica aerogels
J. Samseth, M.B. Kirkedelen, F.A. Maaø, A. Hansen and M.-A. Einarsrud . . . . . 298

*D. Optical*

Light scattering for aerogel characterization
A.J. Hunt . . . . . 303

Transparent silica aerogels
G.M. Pajonk . . . . . 307

Photoluminescence of fullerenes doped in silica aerogels
J. Shen, J. Wang, B. Zhou, Z. Deng, Z. Weng, L. Zhu, L. Zhao and Y. Li . . . . . 315

Synthesis and properties of polypyrrole–vanadium oxide hybrid aerogels
J. Harreld, H.P. Wong, B.C. Dave, B. Dunn and L.F. Nazar . . . . . 319

Light scattering studies of UV-catalyzed gel and aerogel structure
A.J. Hunt and M.R. Ayers . . . . . 325

Surface plasmon resonance evaluation of colloidal silver aerogel filters
D.D. Smith, L. Sibille, R.J. Cronise and D.A. Noever . . . . . 330

**Section 8. Applications**

Aerogel applications
L.W. Hrubesh . . . . . 335

Molecular oxygen sensors based on photoluminescent silica aerogels
M.R. Ayers and A.J. Hunt . . . . . 343

Aerogels as a tool to study the electrical properties of ruthenium dioxide
K.E. Swider, C.I. Merzbacher, P.L. Hagans and D.R. Rolison . . . . . 348

Sintered silica aerogel: a host matrix for long life nuclear wastes
T. Woignier, J. Reynes, J. Phalippou, J.L. Dussossoy and N. Jacquet-Francillon . . . . . 353

Sol–gel processing of energetic materials
T.M. Tillotson, L.W. Hrubesh, R.L. Simpson, R.S. Lee, R.W. Swansiger and L.R. Simpson. . . . . 358

Applications for silica aerogel products
M. Schmidt and F. Schwertfeger . . . . . 364

Silica aerogels in high energy physics
T. Sumiyoshi, I. Adachi, R. Enomoto, T. Iijima, R. Suda, M. Yokoyama and H. Yokogawa . . . . . 369

Four-layer aerogel Cherenkov counter
K. Arisaka, E. Borsato, D. Boutigny, A.R. Buzykaev, F. Dal Corso, I. De Bonis, J. Favier, F. Ferroni, M. Foucher, S.F. Ganzhur, F. Iacovella, H. Jawahery, Y. Karyotakis, G.M. Kolachev, E.A. Kravchenko, R. Lafaye, M.A. Mazzoni, V.I. Mikerov, M. Morandin, S. Morganti, A.P. Onuchin, J. Oyang, G. Piredda, M. Posocco, R. Santacesaria, M. Serra, A.G. Shamov, R. Stroili, V.A. Tayursky, V.I. Telnov, E. Torassa and C. Voci . . . . . 375

Aerogel Cherenkov counters with wavelength shifters and micro-channel plate photo-tubes
A.R. Buzykaev, A.F. Danilyuk, S.F. Ganzhur, T.A. Gorodetskaya, G.M. Kolachev, E.A. Kravchenko, V.I. Mikerov, G.D. Minakov, A.P. Onuchin, A.G. Shamov and V.A. Tayursky . . . . . 381

Author index . . . . . 385

Subject index . . . . . 390